LOOKOUT POINT CAUSEWAY RESILIENCY ASSESSMENT

Town Lands Committee
Harpswell, Maine

November 20, 2020

Submitted to:

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A. Executive Summary

Baker Design Consultants was retained to provide an assessment of the flooding (inundation) that currently occurs on the Lookout Point Causeway and to develop a set of recommendations to reduce the frequency of flooding in the future. Lookout Point Causeway is located on the west side of Harpswell Neck. It connects the mainland shore with a private residence set offshore on high ground that becomes an island when the causeway is overtopped. Refer to *Figure 1: Lookout Point Chart Location- NOAA 13290* below and *Figure 2: Lookout Point site map and elevation contours.* on the next page.

The Lookout Point site was selected because it is currently experiencing inundation during extreme storm events. This report concludes that the current flooding is manageable and does not have a significant impact on the "operability" of the causeway when defined as the ability to access the beach, use the boat ramp and access the private home on the point. Put another way, the current level of occasional flooding is not causing significant damage or erosion that requires Town funding to repair. However, it is recognized that the long-term combination of sea level rise and associated erosion will further impact the operability of the site and will require funds to repair flood damage if nothing is done. The report recommends resiliency measures that include raising the causeway elevation and includes cost estimates to allow the project to be included in a future capital budget.

For the Lookout Point Causeway, it is understood that it is both impracticable (and undesirable) to raise the causeway to an elevation that addresses all future inundation. This would result in a causeway that is at such a high elevation that the ability to access the boat ramp and beach would be impacted. It would also not be a cost-effective solution to address flood risk. Instead, the approach taken in this study has been to:

- Evaluate the risk of future flood events from high tides and storms that include sea level rise;
- Estimate the impact on the operability of the causeway and boat ramp due to said flooding;
- And present recommended actions to mitigate the impacts of the flooding.

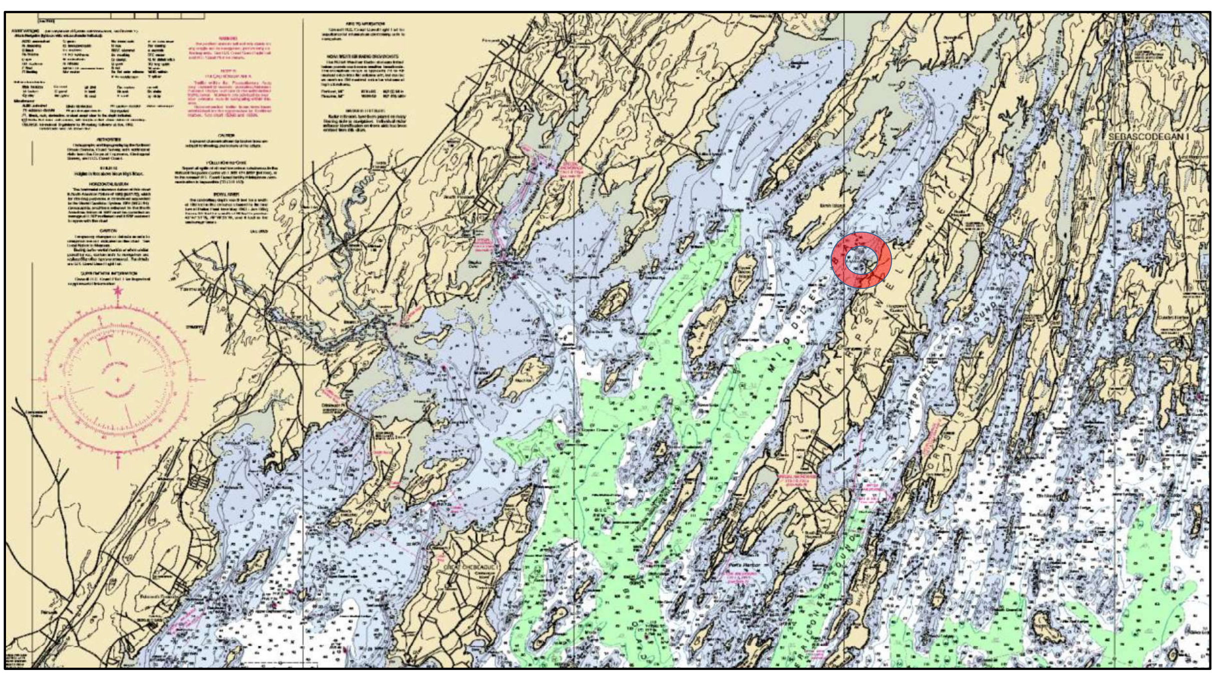


Figure 1: Lookout Point Chart Location- NOAA 13290

Existing Use of the Site

Refer to the photographs located in *APPENDIX A* `SITE PHOTOGRAPHS (Clockwise- North to South)` and *Figure 2* below. The light green hatching shows the location of Town property that includes the boat launch and parking/turn-around areas. The point and islands set offshore from the launch ramp are privately owned. The site features stunning views of Casco Bay and is popular with Harpswell residents. It is used as follows:

- Destination for beach combing, low-tide exploration, swimming, and general enjoyment.
- The boat launch provides access to Middle Bay for wormers, shell fishermen, lobster fisherman, kayakers, and recreational boaters. The ramp gradient is less than ideal for launching boats from a trailer, although large fishing boats[1] can and are hauled out at high tide.
- There is room on the causeway to turn-around and park. Shell fishermen drive right onto the beach and leave vehicles during low tide.

[1]Dolphin Marine hauls several boats from Lookout Point each year.

Figure 2: Lookout Point site map and elevation contours.

Comparison of Current and Future Causeway Flooding (inundation)

The causeway connection and the boat launch have a history of flooding, which has become more frequent in recent years and is predicted to increase in the future due to climate change impacts that include sea level rise and increased storm activity.

An inundation assessment for a Maine coastal property considers predicted tidal elevations and an increase in elevation due to wave action and storm surge. Historical data from tidal benchmarks are compared with tidal predictions to estimate wave action and storm surge. Our analysis of existing conditions is detailed in the report sections that follow and can be summarized as follows:

- The low point of the causeway occurs in the vicinity of the boat ramp. Analysis based on historical measurements (that do not account for sea level rise), indicate a greater than 10% chance in any year that the causeway and boat launch will be inundated by storm surge and waves.
- The amount of Sea Level Rise that occurs in the future will directly impact the flooding at Lookout Point. Flood Risk is discussed in Section C- *Flood Risk* of this report on page 7. It is widely forecasted that a 3 ft sea level rise by year 2070 is a reasonable prediction. When this occurs, Lookout Point is at risk of being inundated for an average of 7% of any given day, or 57 hours per month, if no measures to make the causeway more resilient from its current condition are undertaken.

Action Items to address a Future Site Resiliency

Probability Models that predict sea level rise were consulted. Given the risk to everyday operations and the potential catastrophic damage from storm flooding, the following ACTION ITEMS to reduce inundation and associated damage to the causeway are recommended:

- Raise the elevation of the causeway to at least 9.25 ft (NAVD88). This study shows that this elevation corresponds to a similar frequency of occasional flooding will occur with a sea level rise of 3-ft to that which currently occurs in 2020.
- Add stone riprap on both east and west sides of the causeway to make the causeway more resilient from damage caused by wave action and to protect the existing road and parking/turnaround areas.
- Regrade the boat ramp to meet the new raised causeway elevation. Remove existing asphalt and use articulated concrete planks in the intertidal area. Concrete planks are more resilient and more easily repaired.
- Utilize living shoreline improvements such as oyster baskets in subtidal areas between the offshore islands. The reduced depth of water will encourage waves to break before they reach the causeway.

Action Item Plans and Cost Estimates Are Given

- Total construction cost to protect the boat ramp and causeway from 3 feet of sea level rise is estimated to be $172,000.

- Cost savings may be realized by protecting to a lower sea level rise scenario, but such savings are only incremental and tied directly to the amount of construction materials used .
- Plans are included detailing the action items.

Implementation of the ACTION ITEMS will achieve the following when the 3 feet of sea level rise occurs:

- The risk of daily flooding at the causeway is reduced from 57 hours per month to less than 1 hour per month.
- The boat ramp and causeway will maintain current (2020) levels of operability.
- The elevated causeway would be protected up to the 1% annual storm event, or the 10% storm plus 1 ft of wave action.
- Raising the causeway also provides the opportunity to steepen the boat launch, improving the efficiency of launching boats form trailers.
- Using hardened materials like stone riprap along the causeway embankments and precast concrete on the boat ramp will help prevent damage from wave action and typical use.

B. Background

Lookout Point is a small stretch of land extending north into Middle Bay on the western shore of Harpswell Neck near its midpoint. The point is connected to the mainland via a paved causeway and is sheltered to the west by two small islands. A municipal boat launch, about 175 feet in length extends from the west side of the causeway to the north of the northernmost island, and into Middle Bay. Foot access to the islands, as well as a muddy beach area to the east of the causeway is available during low tides and are frequented by visitors to the area. To the north of the boat launch, there are several informal parking spots where commercial fishermen and clammers park their vehicles and trailers during low tide which are often inundated during each tide cycle. Additional parking exists on both sides of the causeway.

The causeway and boat launch are currently at risk from flooding due to astronomical high tides and storm events. Given current projections of sea level rise, it is likely that both the causeway and boat ramp will continue to see more frequent flooding events and more common damage as those floods occur. The tidal elevations of the project are given in *Table 1: Lookout Point Tidal Data*.

Table 1: Lookout Point Tidal Data

ELEVATION	CHART (ft)	NGVD29 (ft)	NAVD88 (ft)
Highest Annual Tide	12.0	7.5	6.7
MHHW	9.9	5.4	4.7
MHW	9.5	5.0	4.2
NAVD88	5.3	---	0.0
NGVD29	4.5	0.0	---
MLW	0.4	-4.2	-4.9
MLLW	0.0	-4.5	-5.3
Stillwater Elevations			
FEMA 10-yr Storm	11.9	7.4	8.1
FEMA 100-yr Flood	12.9	8.4	9.1
FEMA 500-yr Flood	13.5	9.0	9.7
FEMA Base Flood	23.8	19.3	20

The purpose of this report is to assess the risk of future flood events from high tides and storms including the effects of sea level rise, to estimate the impact on the operability of the causeway and boat ramp due to said floods and to recommend actions to mitigate the impacts of the flooding. A performance-based engineering design methodology is adopted to achieve these goals. *Table 2* shows the performance levels used to guide the recommended actions for capital improvements to decrease the damage to the boat ramp and causeway and protect against catastrophic losses.

Table 2: Performance Based Decision Matrix for the Boat Ramp and Causeway

Inundation Frequency (hours/mo.)	SLR 2020 (Flood Elev.)	NOAA Sea Level Rise Scenario/Year	Operational Status	Damage Potential	Recommended Action/Timeframe
Rare (<1)	<1’ (8.25’)	Low/2070	Operational	Minor Erosion	Plan for Resilience and Secure Funding/Now
Occasional (<5)	1’-2’ (9.25’)	High/2030 Intermediate-Low/2070	Diminished Access	Moderate Erosion, Some Pavement Loss	Conduct Improvements/By 2025
Frequent (<30)	2’-3’ (10.25’)	High/2040 Intermediate/ 2070	Planned Inoperability	Severe Erosion, Pavement Loss, Vegetation Die Off	Major Improvements Needed/By 2030
Common (>30)	>3’ (10.25’)	Extreme/2050 Intermediate-High/2065	Site Inaccessible	Complete Destruction	Retreat from Site

The performance levels in *Table 2* are ranked from lowest to highest damage potential. The inundation frequency is measured in total hours per time period that the causeway is inundated by normal tide cycles, with the current rate of inundation on the order of several hours per year. The NOAA Sea Level Rise Scenarios correspond to the incremental rises shown in *Figure 5*, combined with the inundation rates shown in *Figure 8* to obtain the expected year of inundation of the causeway. For example, it is expected that the causeway will be inundated roughly once a month if 1-foot of sea level rise occurs, which corresponds to a “High” scenario by the year 2030, or an “Intermediate-Low” scenario by the year 2070. The operational status of a given performance level indicates whether the site can maintain current activity levels. The Damage Potential column lists the likely forms of damage of a given inundation level, while the Recommended Action column lists the recommended planning steps to take to mitigate the damages and keep the current operability levels.

The goal of the recommended actions is to maintain the current usability and access of the current boat ramp. Therefore, future impacts to the ramp need to be assessed, and is done so in the following section.

C. Flood Risk

Tidal Flooding and Sea Level Rise

The first source of flooding at the causeway and boat launch at Lookout Point is flooding due to high tide cycles with the addition of future sea level rise. While historical tidal measurements at Lookout Point are not available, tidal conditions are similar to those measured at gage 8418150 in Portland, Maine. Measurements at the Portland gage date back over 100 years, providing a good confidence for both tide and sea level rise estimates, and have nearly identical tide elevations to those predicted at Wilson Cove in Harpswell, just a mile north of Lookout Point. The harmonic constituents derived from Portland tidal measurements can be used to predict tidal fluctuations in the future, as shown in *Figure 3*.

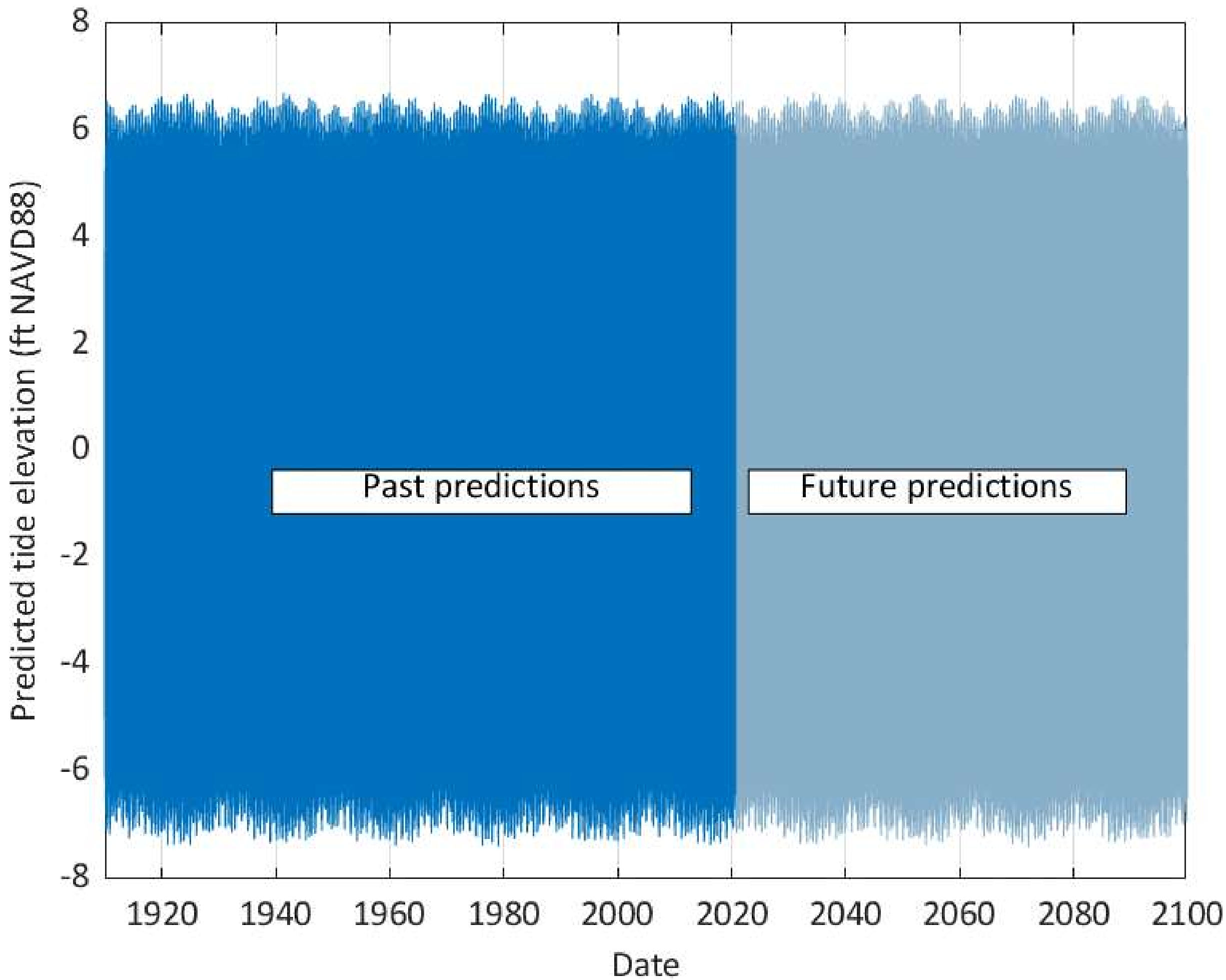


Figure 3: Tide predictions spanning almost 200 years in Portland, Maine

The past difference between measured tidal elevations and predicted elevations can be attributed to sea level rise and storm surge. Past sea level rise can be accurately represented by averaging tide levels on a monthly basis, as is shown in *Figure 4*.

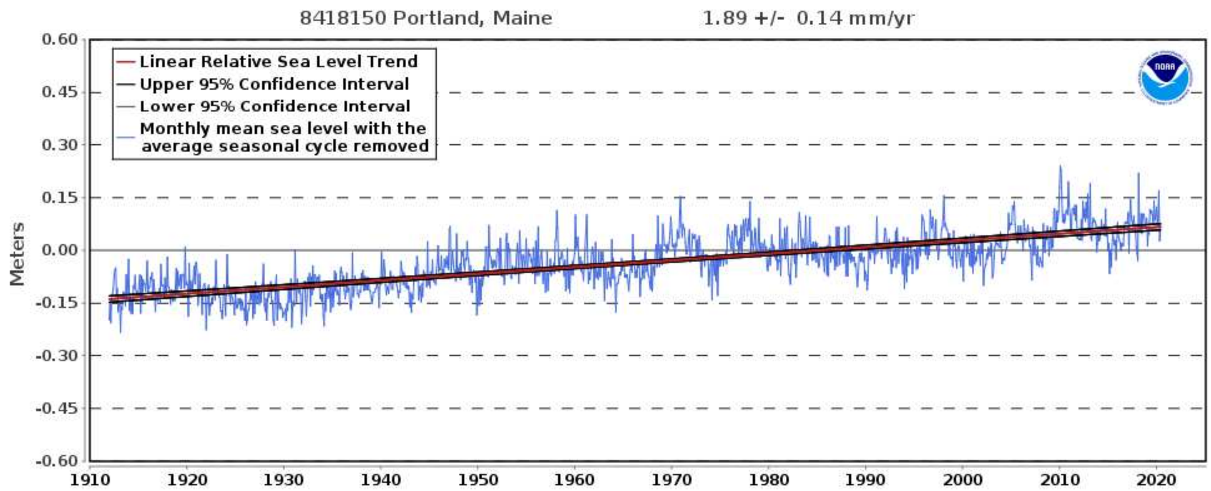


Figure 4: Measured tidal data from Portland, Maine tide gage showing the effects of sea level rise.

Figure 4 shows the upward trend in the mean sea level over the past century as measured in Portland. Note that the 95% confidence interval is larger at the beginning and end of the data recording, indicating that a linear fit to the data becomes less appropriate at these extremes. As sea level rise accelerates in the future, model predictions are necessary to evaluate the increased risk of flooding due to sea level rise. In this report NOAA predictions of sea level rise are used to determine the future risk of tidal inundation of Lookout Point.

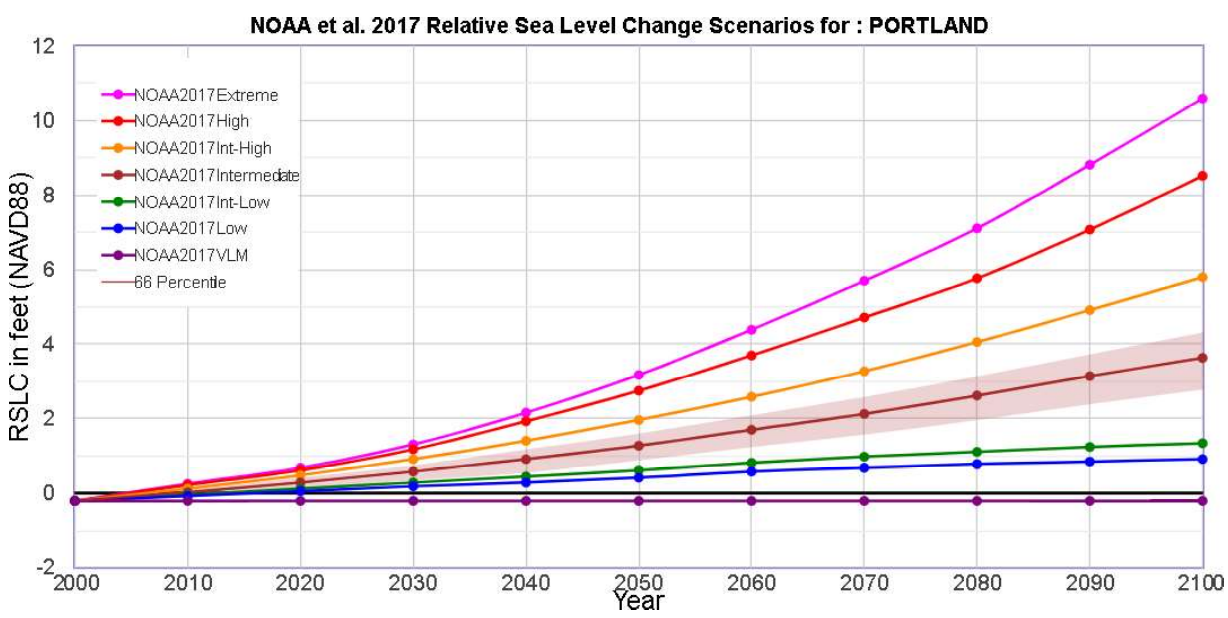


Figure 5: Prediction scenarios of future sea level rise according to NOAA.

Intermediate-low, intermediate, to intermediate-high scenarios shown in *Figure 5* as green, dark-red and yellow curves, respectively, are investigated here to represent approximations of sea level rise of 1-ft, 2-ft, and 3-ft. It should be noted that the curves in *Figure 5* represent mean predictions for specific climate change scenarios, each having its own uncertainty bounds centered about the mean, shown in *Figure 5* for the intermediate scenario as the shaded red region. The Int-Low, Intermediate, and Int-High scenarios are added to tide predictions shown in *Figure 3* to predict future tidal elevations as shown in *Figure 6*.

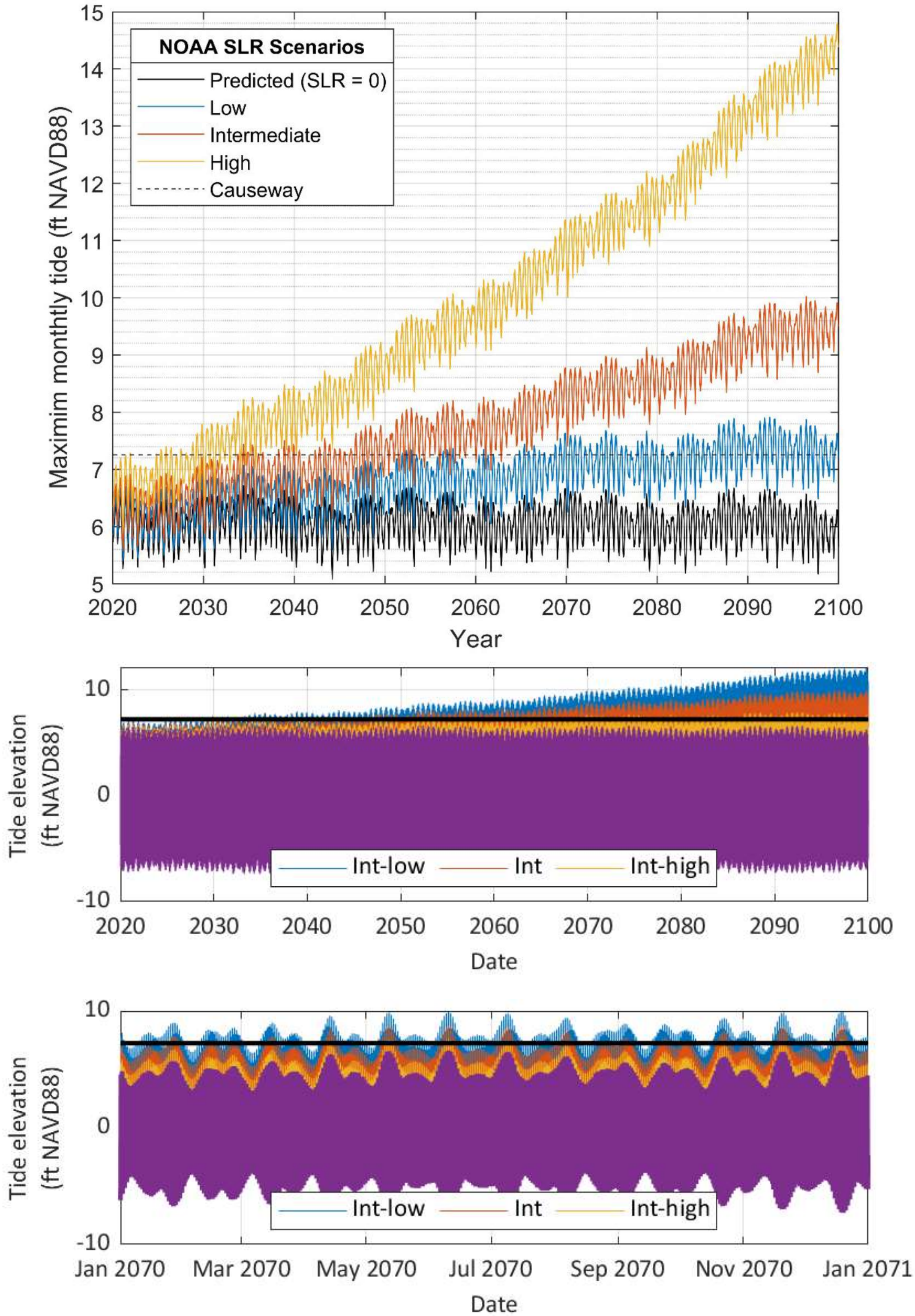


Figure 6: Predicted monthly maximum tidal elevations plus NOAA sea level rise scenarios up to the year 2100. The black line represents the predicted monthly tidal maxima, while the dashed black line represents the current causeway elevation.

Convoluting the sea level rise elevations with tidal ranges results in inundation rate curves for various sea level rise scenarios as shown in *Figure 7*. This convolution process assumes that the tidal variation at Lookout Point is independent of sea level rise.

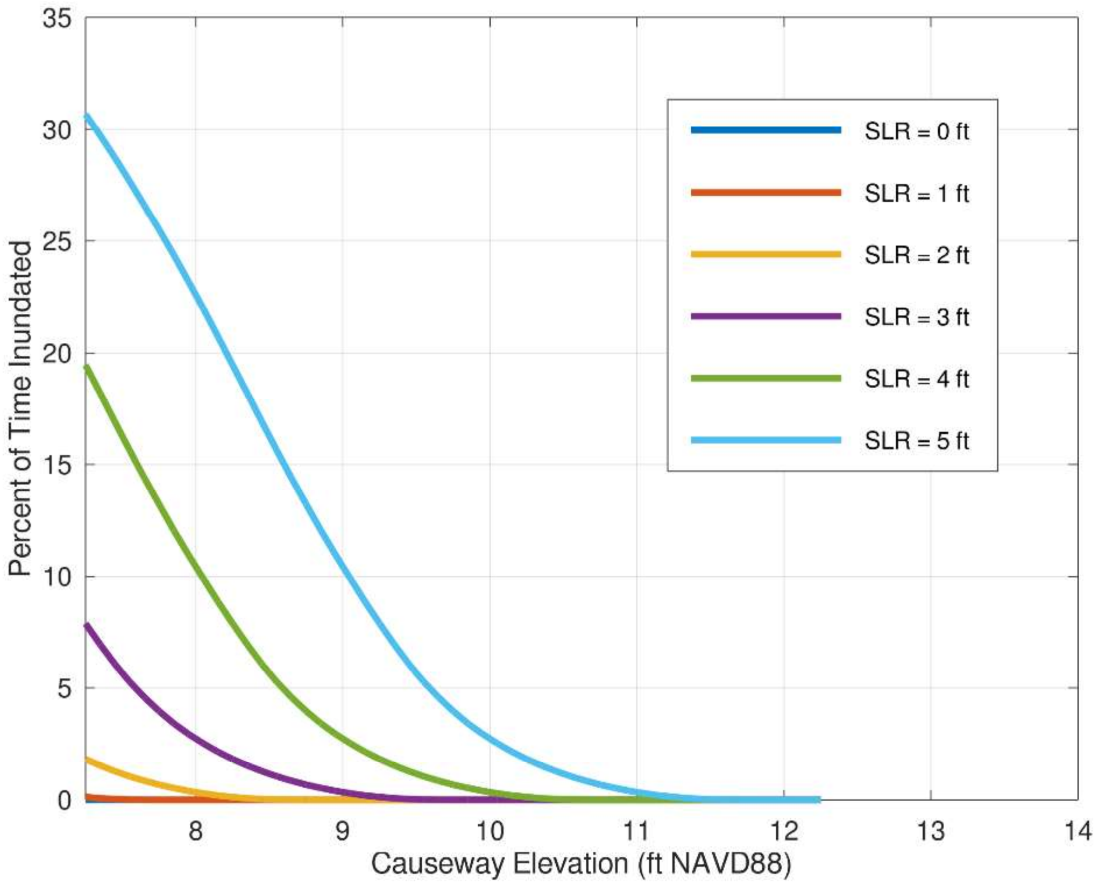


Figure 7: Graph showing the percentage of tides inundating the causeway for various SLR scenarios and causeway elevations.

The curves in *Figure 7* represent the likelihood of the water level in *any* hour exceeding the causeway elevation for various SLR scenarios and causeway elevations. The blue, which hugs the x-axis, shows the current inundation likelihood, which is essentially zero. The yellow curve represents a sea level rise scenario of 2 ft, which is equivalent to a the sea level rise in a "high" scenario 20 years in the future, or an "intermediate" scenario 30 years in the future, as shown in *Figure 5*. For 3 ft of sea level rise and current causeway elevation of 7.25 feet, 7.8% of all tides would overtop the causeway, while fewer than 0.2% of all tides overtop the causeway if it is elevated by 2 ft. The y-axis of *Figure 7* may be scaled to represent time units for more intuitive interpretation. For example, *Figure 8* shows the same exceedance curves with time scaled to hours/month to assess the loss of operability in the causeway and access to the boat launch on a monthly basis.

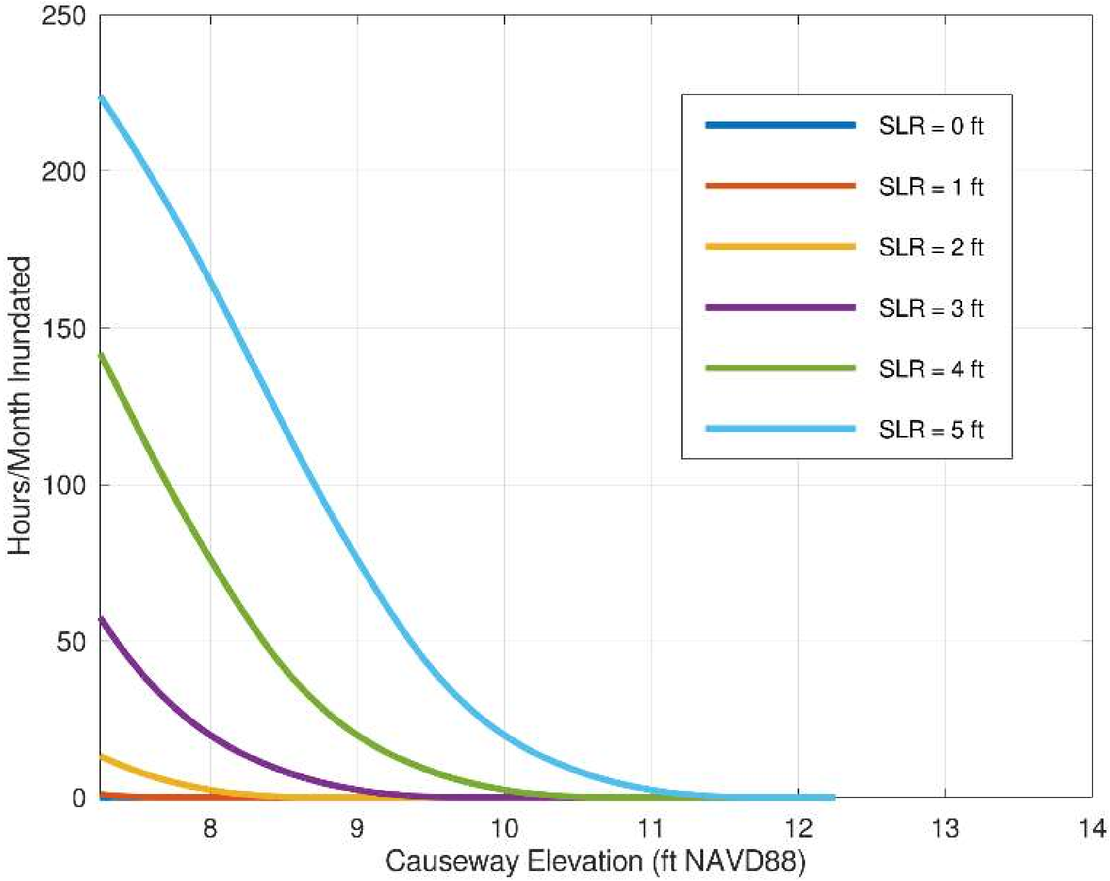


Figure 8: Graph showing the expected number of hours of inundation in a month for various SLR scenarios and causeway elevations.

The curves in *Figure 8* represent the expected number of hours of inundation per month at various sea level rise scenarios and causeway elevations. The x-axis remains the same as *Figure 7*, while the y-axis is scaled to average or expected number of hours that the causeway will be inundated. For 3 ft of sea level rise and current causeway elevation the causeway will be overtopped on average 57 hours per month, while the causeway is expected to be overtopped less than 1 hour per month if it is elevated an additional 2 feet.

Storm Induced Flooding

The second source of flooding for the causeway and boat ramp at lookout point is extreme flooding due to storm events. Storm events can produce storm surge, wave overtopping, and wave runup at coastal locations leading to risk of erosion or damage to infrastructure. Storm induced flood events are less common than tidally induced storm events but can cause significantly more damage due to the dynamic action of waves and increased inundation area and depth.

Figure 9 shows a subset of FEMA Firm Panel 23005C0586F, with the whole panel given in Appendix A. Of note in *Figure 9* are the VE Zones to the east and west of Lookout Point with BFEs of 20 and 18 feet, respectively. The nearest transect to lookout point is Transect 124, and is just 700 feet to the south, providing a trustworthy analysis point for wave plus flood hazard, as shown in *Table 3*.

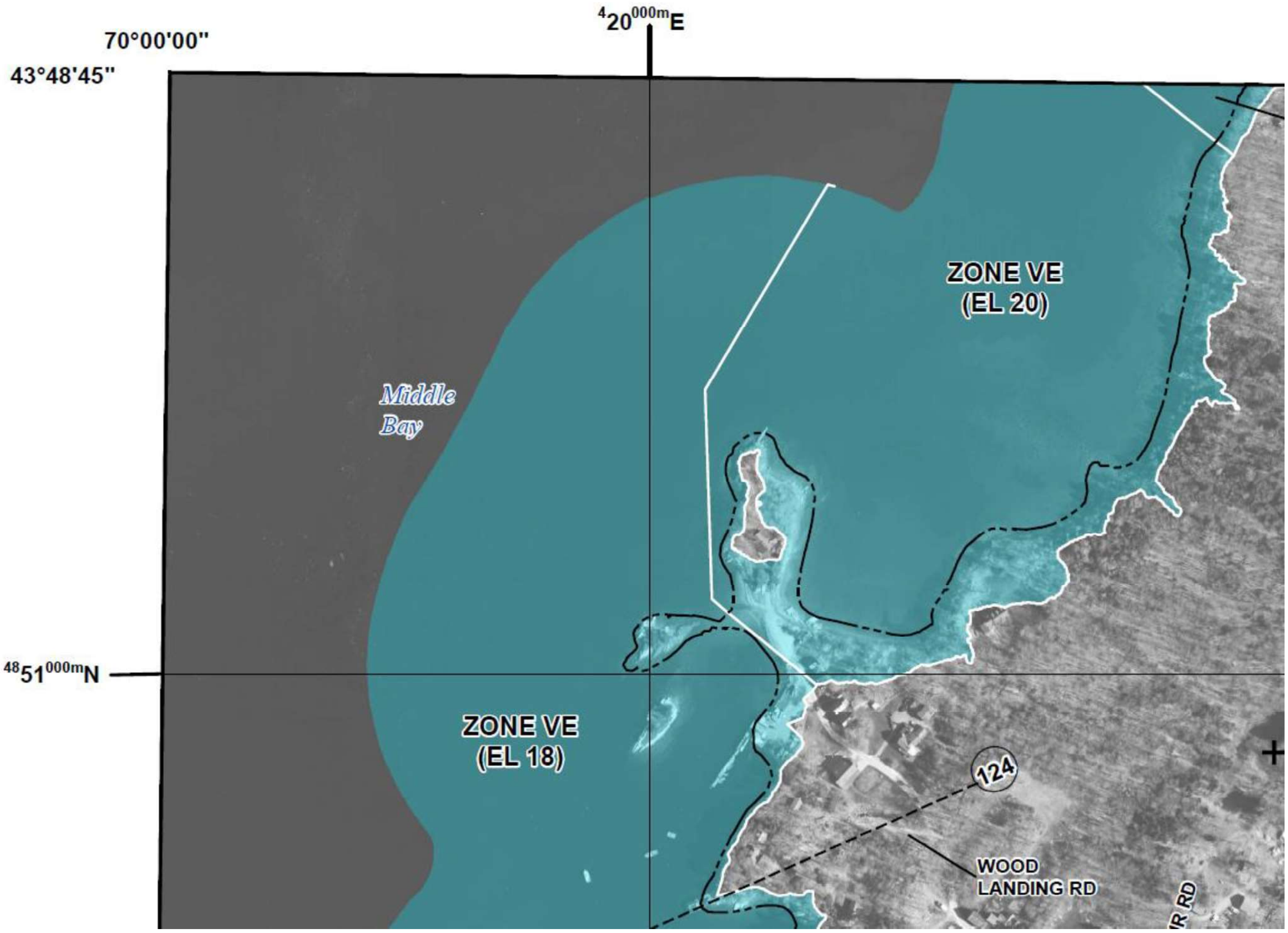


Figure 9: Subset of FEMA Preliminary FIRM Panel 23005C0586F.

The base flood elevations shown in *Figure 9* are well above the elevation of the causeway, with nothing short of strategic retreat from the site being able to protect against the 1% design flood levels. The base flood elevations shown in *Figure 9* are a combination of the still water level due to storm surge plus the effects of wave height, overtopping, and runup. The still water levels from the FEMA Flood Insurance Study at Transect 124 are given in *Table 3*.

Table 3: Stillwater and Wave Conditions from FEMA FIS Transect 124

Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) % Annual Chance Storm					Preliminary Base Flood Elevations (ft NAVD88)	
H_s (ft)	T_p (s)	10%	4%	2%	1%	0.2%	East	West
2.5	4.8	8.1	*	8.7	9.1	9.70	20	18

The still water elevations given in *Table 3* show that the causeway has a 10% chance in any given year to be overtopped by flood conditions, without including wave runup, overtopping, or sea level rise, which confirms anecdotal reports of nearly annual flooding during Nor'easters. Elevating the causeway by two feet to elevation 9.25 (NAVD88) would bring it above the 1% annual still water elevation but the causeway would still be susceptible to overtopping due to wave action.

Attention should be given to the lifetime likelihood of the 10% chance (and other, less likely storms) occurring during a project lifetime. Given a probability of occurrence in a given year, the cumulative chance of a given flood scenario may be defined using the binomial process as:

$$P_{cumulative} = 1 - \left(1 - \frac{1}{P_{annual}}\right)^{T}$$

Where $P_{cumulative}$ is the cumulative probability of a flood level being exceeded, P_{annual} is the annual probability of exceedance, and T is the duration of interest in years. Therefore, for a project with an expected life of 25 years, there is a 93% chance of the 10% storm occurring in the project lifetime. Cumulative probability of extreme events is useful in evaluating the lifetime risk of a project and should be kept in mind when making decisions about investing in infrastructure improvements.

D. Recommended Action

The risk of the causeway and boat ramp flooding given current sea levels is limited to “nuisance” flooding, where the boat ramp is inundated at most several times a year during winter storms. Protecting the site against the base flood defined by FEMA is unattainable. However, careful planning and proper use of materials and construction methods can allow the causeway and boat ramp to inundate gracefully and limit damage in the case of the design flood. *Figure 10* below shows the decision process for obtaining the design causeway elevation of 9.25 ft. *Figure 10* displays the inundation rates vs. causeway elevations for various sea level rise scenarios. Also shown in the figure are shaded regions of performance based operational statuses from *Table 2*, and the current and recommended causeway elevations. The basis for the 9.25 ft suggested causeway elevation is derived from by taking the intersection of the 3 ft sea level rise curve and the boundary between diminished access (~1 hour per month of inundation) and fully operational (<1 hour per month of inundation). At this point, it is expected that the causeway will be inundated less than once per month from normal tidal cycles and will maintain diminished access up to four feet of sea level rise.

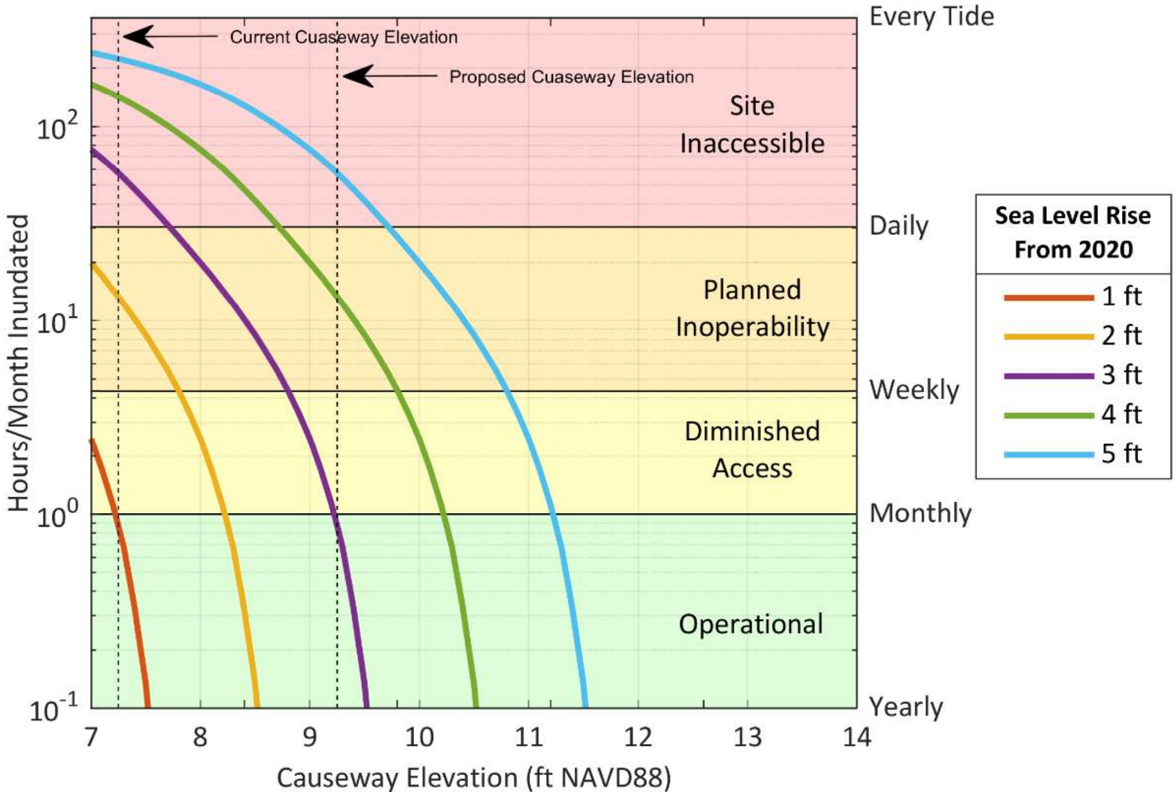


Figure 10: Inundation rates vs. causeway elevation for different SLR ratios. Also shown are the performance based operational statuses from Table 2 and the current and proposed causeway elevations. Note logarithmic y-axis.

The improvements proposed below will protect the causeway against “nuisance” flooding that will become more common in the future to help maintain access to the boat launch. The recommended improvements and their benefits to Lookout Point include:

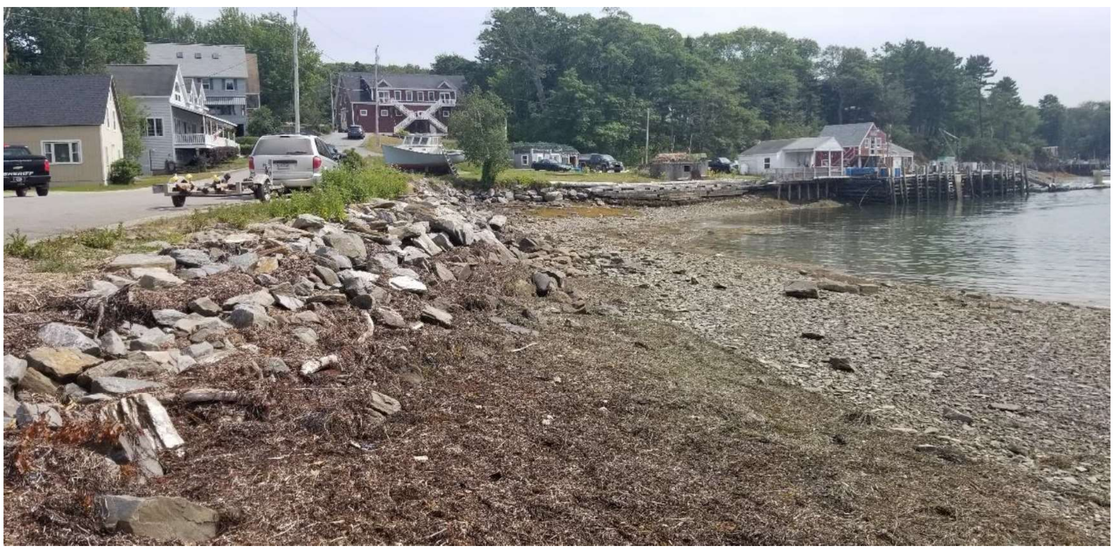
1. Raise the elevation of the causeway to at least 9.25 ft (NAVD88)
   - Prevents against nuisance flooding

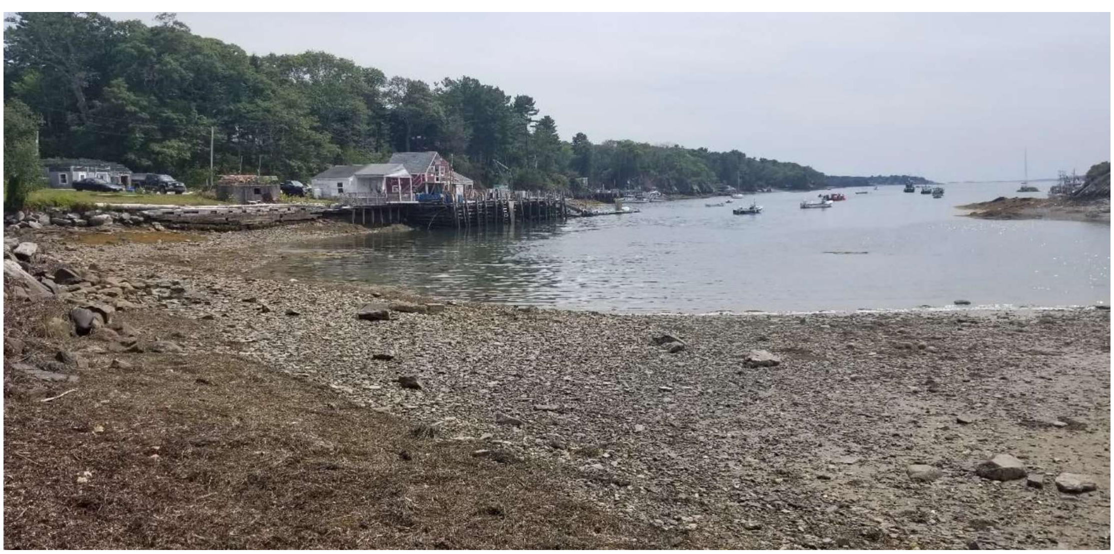
  - Maintains 2020 operability levels of the boat launch up to 3 feet of sea level rise
  - Proper construction prevents against damage during storm flood events
2. Stone riprap on both east and west sides of dirt road to meet natural grades
   - Limits erosion due to wave action during annual storms
   - Potentially limits catastrophic damage during design flood
3. Regrade the boat ramp to meet the new causeway elevation
   - Provides easier access to boaters
   - Meets proposed causeway elevation
   - Provides space for riprap to be placed to protect boat ramp from wave damage
4. Replace asphalt boat ramp with precast concrete planks
   - Prevents cracking and pavement loss during nuisance floods
   - Provides a more robust launch area for potential use as emergency access point
5. Utilize living shoreline improvements such as oyster baskets to reduce wave action in subtidal areas to the east and west of the point
   - Lessens wave action on the causeway and boat ramp to decrease erosion and damage

A set of schematics have been included in Appendix B that show recommended improvements and how they may be addressed given current site conditions. The schematics are preliminary in nature and rely on the current publicly available data.

APPENDIX A SITE PHOTOGRAPHS (Clockwise- North to South)


SHERIFF

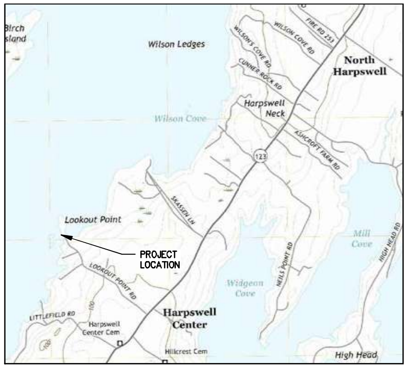




APPENDIX B- COST ESTIMATE (3-ft Sea Level Rise Solution)

ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	AMOUNT
0.01	EROSION CONTROL	LS	1	$5,000.00	$5,000.00
0.02	EXCAVATION (Reuse if Suitable)	CY	440	$25.00	$11,000.00
0.03	COMMON BORROW	CY	160	$25.00	$4,000.00
1.01	RIPRAP	CY	160	$75.00	$12,000.00
1.02	GEOTEXTILE	SY	230	$7.00	$1,610.00
2.01	18" AGGREGATE BASE TYPE "B" - PARKING	CY	590	$45.00	$26,550.00
2.02	3.5" - 12.5 MM HMA PARKING	TON	210	$125.00	$26,250.00
2.03	PAVEMENT MARKINGS	LS	1	$500.00	$500.00
3.01	LOAM & SEED	SY	270	$10.00	$2,700.00
4.01	18" X 12' PRE-CAST CONCRETE PLANK (FULL DEPTH)	EA	88	$350.00	$30,800.00
5.01	MOBILIZATION / DEMOBILIZATION	LS	1	$12,041.00	$12,041.00
				SUBTOTAL	$132,451.00
				30% CONSTRUCTION CONTINGENCY	$39,740.00
				TOTAL	**$172,191.00**

APPENDIX C- DRAWINGS (3-ft Sea Level Rise Solution)



PROJECT LOCATION

NOTES:
1. CONTOUR AND PARCEL INFORMATION COLLECTED FROM MAINE OFFICE OF GEOGRAPHIC INORMATION SYSTEMS (MEGIS) WEBSITE.
2. SURVEY FOR LEVEEN PROPERTY MERGED WITH GIS CONTOUR INFORMATION. SURVEY USED IS ENTITLED "BOUNDARY AND TOPOGRAPHIC SURVEY AT 12 LOOKOUT POINT ROAD, HARPSWELL, MAINE MADE FOR STEVE LEVEEN" AND DATED 09–20–16.
3. LEVEEN PROPERTY CONSTRUCTION UPDATES COMPLETED IN 2018 SHOWN USING CONSTRUCTION DRAWINGS COMPLETED BY BAKER DESIGN CONSULTANTS.
4. ELEVATIONS ARE SHOWN TO THE NORTH AMERICAN DATUM OF 1988 (NAVD88) AND BEARINGS ARE REFERENCED TO THE STATE PLANE COORDINATE SYSTEM OF 1983, MAINE WEST ZONE.

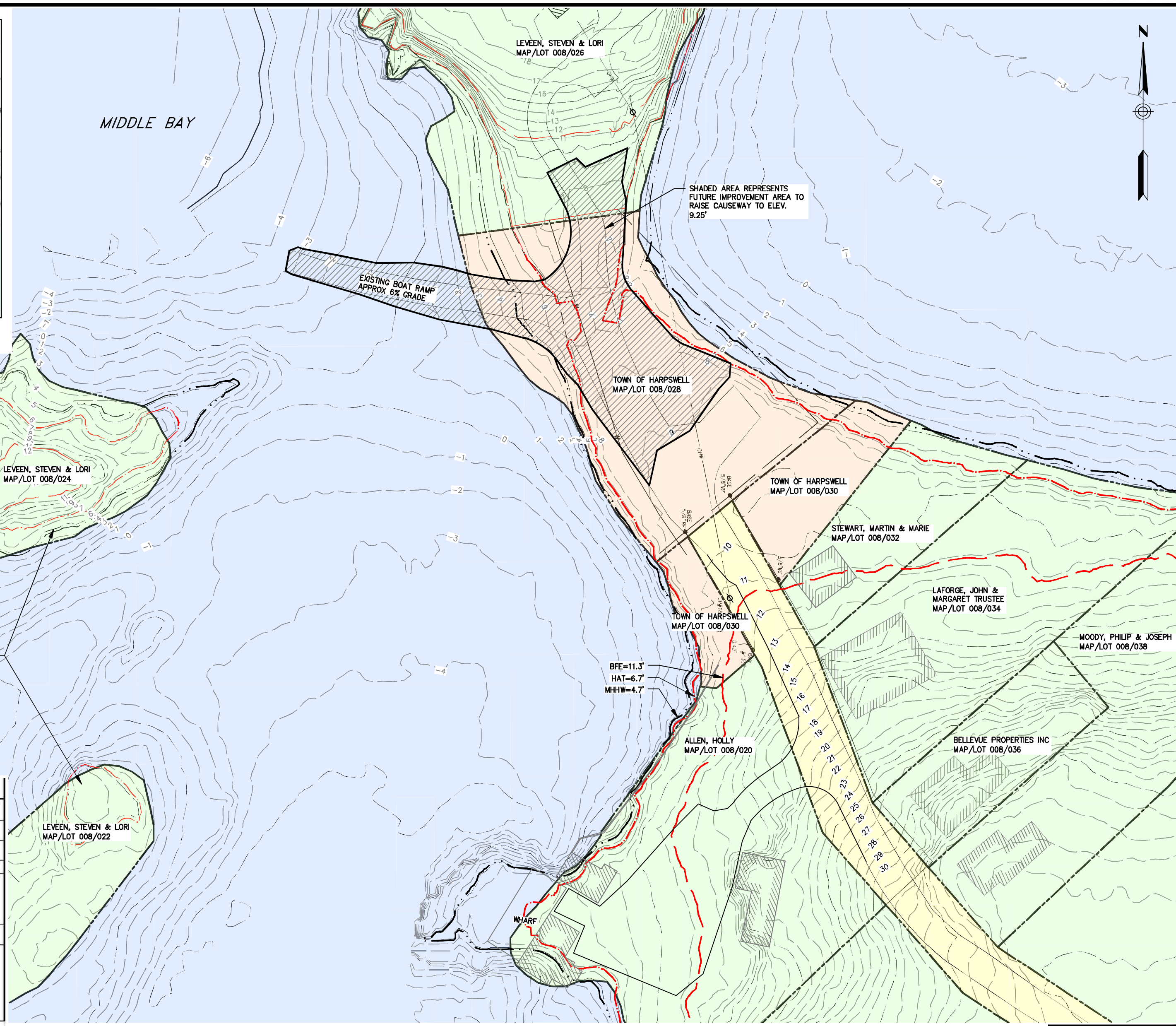
LEGEND

- 25 — MAJOR CONTOURS
- MINOR CONTOURS
- BUILDINGS
- PARCEL BOUNDARIES (MEGIS)
- BASE FLOOD ELEVATION = 18.0'
- HIGHEST ANNUAL TIDE = 6.7'
- MEAN HIGHER HIGH WATER = 4.7'
- MEAN LOWER LOW WATER = -5.3'
- TOWN PROPERTY PARCEL
- RIGHT OF WAY PARCEL
- PRIVATE PROPERTY PARCEL
- UTILITY POLE
- OVERHEAD UTILITIES

PROJECT ELEVATIONS (BY DATUM)

ELEVATION	CHART (ft)	NGVD29 (ft)	NAVD88 (ft)	Notes
Preliminary Base Flood Elevation East	25.3	20.7	20.0	FEMA 2013 FIRM, ZONE VE
Preliminary Base Flood Elevation West	23.3	18.7	18.0	FEMA 2013 FIRM, ZONE VE
Base Flood Elevation	16.5	12.0	11.3	FEMA 1985 FIRM, ZONE A3
500-Year Stillwater	14.5	10.0	9.7	FEMA 1985 Flood Insurance Study
100-Year Stillwater	14.0	9.5	9.1	
50-Year Stillwater	13.8	9.3	8.7	
10-Year Stillwater	13.2	8.7	8.1	
Highest Annual Tide	12.0	7.5	6.7	2016 MEDEP Predictions (Wilson Cove, Middle Bay)
MHHW	9.9	5.4	4.7	BASED ON NOAA TIDAL BM 8418150 "Portland"
MHW	9.5	5.0	4.2	
NAVD88	5.3	—	0.0	
NGVD29	4.5	0.0	—	
MLW	0.4	-4.2	-4.9	
MLLW	0.0	-4.5	-5.3	

1. BASE FLOOD INFORMATION TAKEN FROM FEMA FLOOD INSURANCE RATE MAP
2. HIGHEST ANNUAL TIDE TAKEN FROM MAINE DEP PUBLISHED PREDICTIONS
3. TIDAL INFORMATION TAKEN FROM NOAA PUBLISHED DATA



EXISTING CONDITIONS

0 15 30 45 90

NOT FOR CONSTRUCTION

PRELIMINARY FOR REVIEW ONLY

BAKER DESIGN CONSULTANTS
Civil, Marine, and Structural Engineering
7 Spruce Road • Freeport • Maine • 04032 • 207-846-9724 • info@bakerdesignconsultants.com

NO.	SUBMISSION	DATE	INT.
A	PRELIMINARY DESIGN	10.21.20	BJB

STATE OF MAINE ★ BARNEY J. BAKER No. 5737 LICENSED ★ PROFESSIONAL ENGINEER

DESIGNED BY: MMC
DRAWN BY: MMC
CHECKED BY: BJB
SCALE: AS SHOWN

SHEET TITLE: EXISTING CONDITIONS PLAN

PROJECT: TOWN LANDS COMMITTEE
LOOKOUT POINT RESILIENCY PLAN
HARPSWELL, MAINE

DATE: OCT 2020
CONTRACT NO. 20-36
SHEET NO. C-0
REV. A

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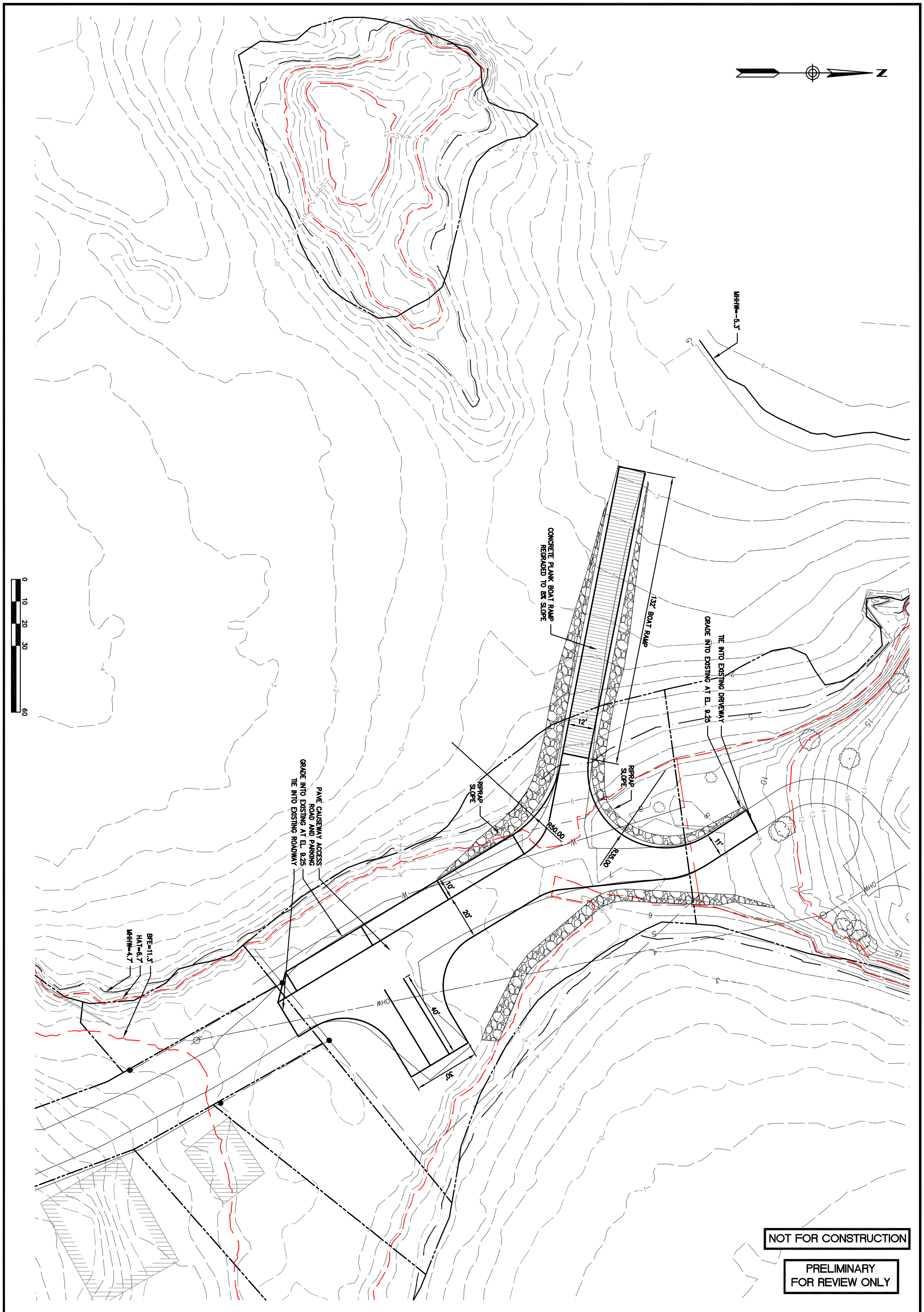

NOT FOR CONSTRUCTION

PRELIMINARY
FOR REVIEW ONLY

SHEET TITLE: SITE PLAN	DESIGNED BY: MMC	
	DRAWN BY: MMC	
PROJECT: TOWN LANDS COMMITTEE LOOKOUT POINT RESILIENCY PLAN HARPSWELL, MAINE	CHECKED BY: BJB	
	SCALE: AS SHOWN	

DATE: OCT 2020
CONTRACT NO. 20-36
SHEET NO. C-1
REV. A

STATE OF MAINE
BARNEY J. BAKER
No. 5737
LICENSED PROFESSIONAL ENGINEER

NO.	SUBMISSION	DATE	INT.
A	PRELIMINARY DESIGN	10.21.20	BJB

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Civil, Marine, and Structural Engineering
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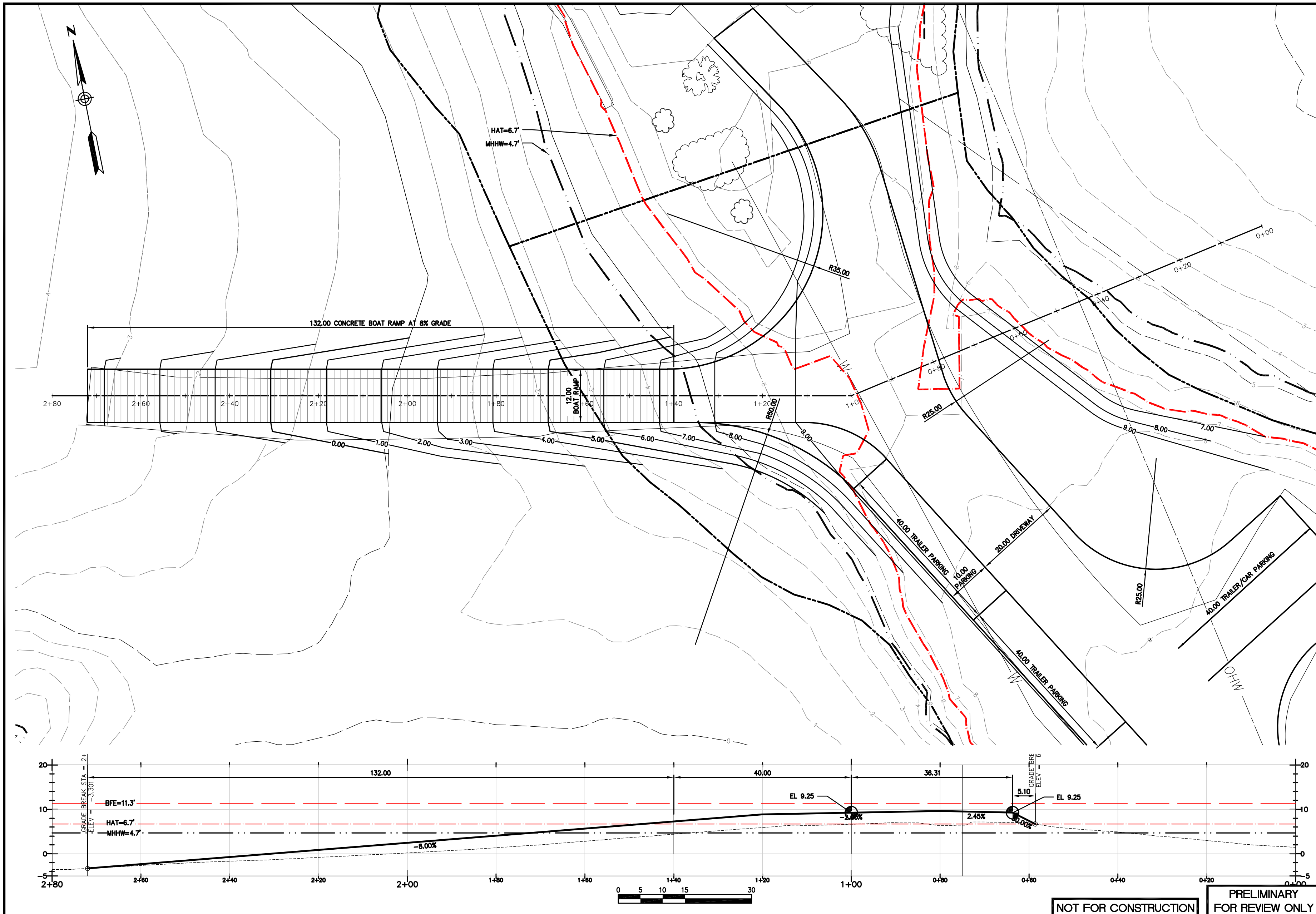

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NO.	SUBMISSION	DATE	INT.
A	PRELIMINARY REVIEW	10.21.20	BJB

STATE OF MAINE
BARNEY J. BAKER
No. 5737
LICENSED
PROFESSIONAL ENGINEER

DESIGNED BY: MMC
DRAWN BY: MMC
CHECKED BY: BJB
SCALE: AS SHOWN

SHEET TITLE: BOAT RAMP PLAN & PROFILE

PROJECT: TOWN LANDS COMMITTEE
LOOKOUT POINT RESILIENCY
HARPSWELL, MAINE

DATE: OCT 2020
CONTRACT NO. 20-36
SHEET NO. C-2
REV. A

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